James C. DiPaula, Jr.
Secretary

MARYLAND
DEPARTMENT OF
BUDGET & MANAGEMENT

Robert L. Ehrlich, Jr.
Governor

Michael S. Steele
Lt. Governor

Maryland Technical Architecture Framework (MTAF)

Enterprise Architecture Awareness Seminar:

"Technical Architecture 101"

November 10, 2004

Welcome

- Seminars designed as educational
- Encourage your participation throughout the MTAF project
- Next steps will be crucial as standards are being developed
- Tell us what you think!

Welcome

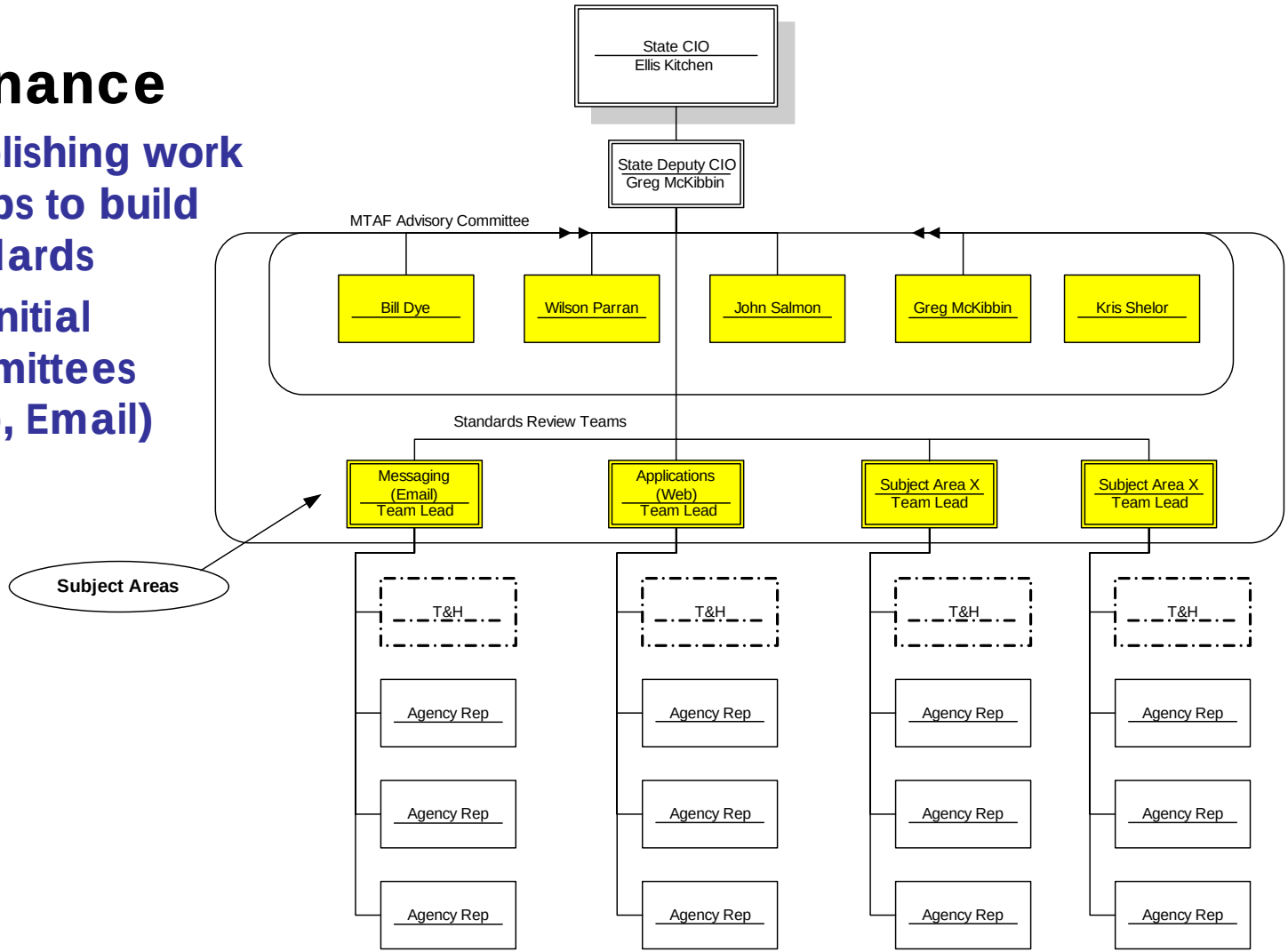
- **Previous Seminar: Introduction to Enterprise Architecture (EA)**
  - July 2004
  - Overview of EA concepts, frameworks, and an introduction to the MTAF project
- **This session: Technical Architecture**
  - A more in-depth look at the technical layer in an EA framework
  - Discussion of Maryland's Technical Architecture Framework project
- **Upcoming: Three more EA seminars**
  - Topics to be determined

Architecture Fronts

- **MTAF Project**
  - Completed the validation sessions
  - Finalizing the business driver and guiding principles documents
  - Working on the Technical Reference Model
  - Creating a repository of technical information (metadata) that will be web-enabled for easy agency reference
  - Developing standards

Architecture Fronts

- **Governance**
  - Establishing work groups to build standards
  - Two initial committees (Web, Email)



Architecture Fronts

- **New Architecture Community**

  www.dbm.maryland.gov

  - **Technology Folder:**

    → **IT Architecture**

  - **To provide more information on Architecture:**
    - **MTAF project documents**
    - **Reference material**
  - **To launch the Technical Reference Model**

IT Architecture - Microsoft Internet Explorer

File Edit View Favorites Tools Help

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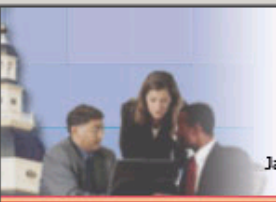
Address http://www.dbm.maryland.gov/portal/server.pt?space=CommunityPage&cached=true&parentname=MyPage&parentid=0&in_hi_userid=1332&control=SetCommunity&Cor Go Links



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11/3/2004
What's New

Maryland's new architecture web site is launched.

Contact info:
mtaf@dbm.state.md.us

Conferences And Events

- EA Training Seminar: November 10th, 2004

IT Enterprise Architecture Program

Maryland's IT Enterprise Architecture (EA) program provides a cohesive statewide framework for IT resources to enable cost-effective use of technology, promote cross-agency collaboration, establish standards and guidance, and improve services to the citizens of the State.

IT Architecture

About The MTAF Project
Information about the Maryland Technical Architecture Framework (MTAF) Project, presentations, and other project-related documents.

EA Reference Corner
Links to information about Enterprise Architecture programs at the federal level and other states.

Governance
List of EA program participants, advisory board(s), and other contact information.

NASCIO Guidance On EA
Find the documents and links for NASCIO's Adaptive Enterprise Architecture Development Program.

Other Maryland Statewide Initiatives
Links to other strategic statewide initiatives, blueprints, and projects within the State.

Maryland's Technical Reference Model

Maryland will be developing a repository of technical information which will include data about products, services, and standards. This will be organized in a logical structure that will be referred to as Maryland's Technical Reference Model or TRM. You will be able to enter the repository from this location.

Watch this space for updates on this future capability!

About DBM Privacy Notice Accessibility

http://www.dbm.maryland.gov/portal/server.pt?space=CommunityPage&cached=true&parentname=MyPage&parentid=0&in_hi_userid=1332&con Internet

Start Inbox - Microsoft Outlook N:\Security & Architectur... IT Architecture - Micr... 3:10 PM

Agenda

- Introduction
- Recap of Enterprise Architecture
- Technical Architecture Framework (TAF)
- Technical Reference Model (TRM)
- State of Maryland
- Questions & Answers

Introduction

Introduction

- Paula Ebnet, Thomas & Herbert
- Mariyo Nzuwah, Booz Allen Hamilton
- Otis Lee, Thomas & Herbert

EA Recap

Enterprise Architecture

- Enterprise Architecture (EA) is an operating discipline comprised of frameworks, methodologies, and delivery processes that can be leveraged to manage the complexities of an organization.

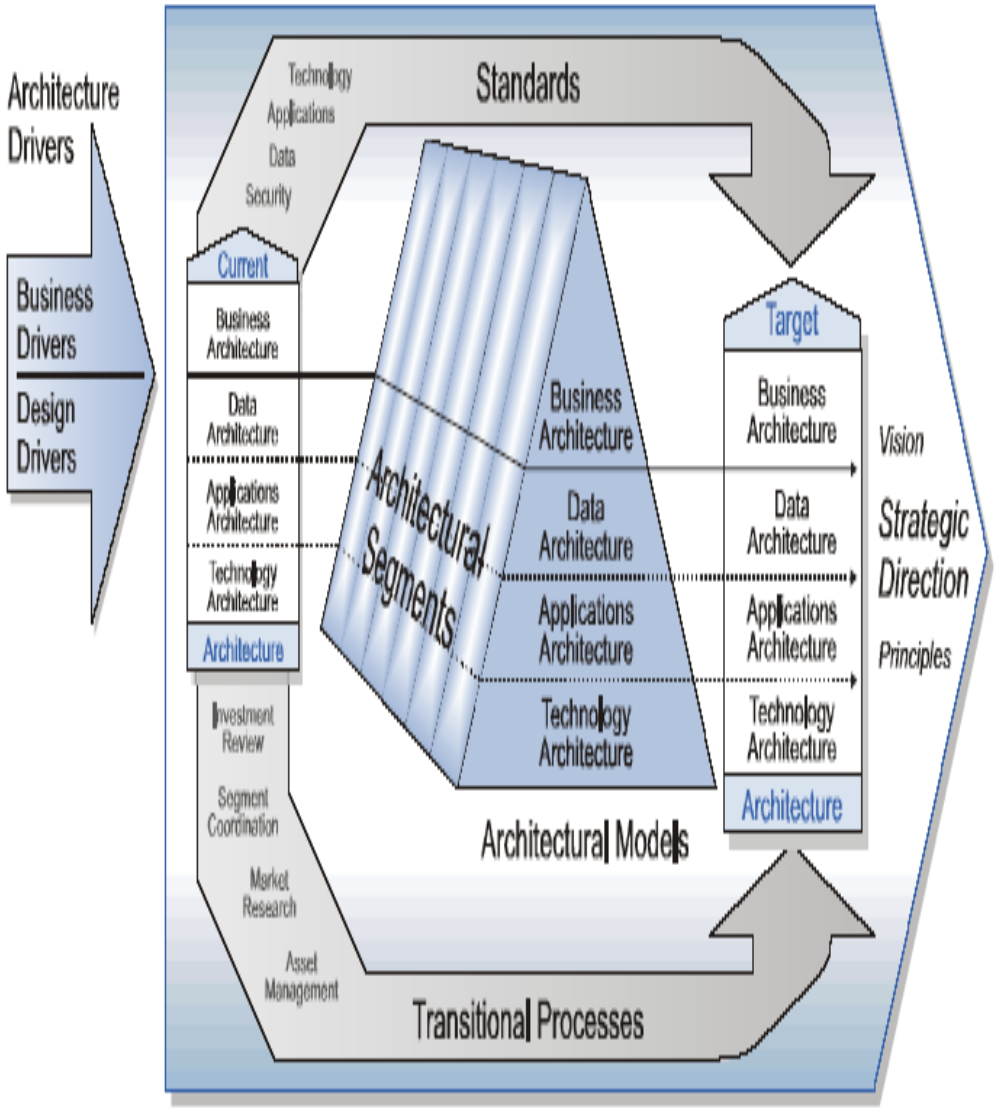
- EA enhances an organization's ability to deliver effective and timely services and supports the efforts to improve organizational functions, thereby, improving services to customers.

EA Framework

EA Framework is the overarching structure that addresses the Enterprise Architecture elements and their interrelation in an organized fashion.

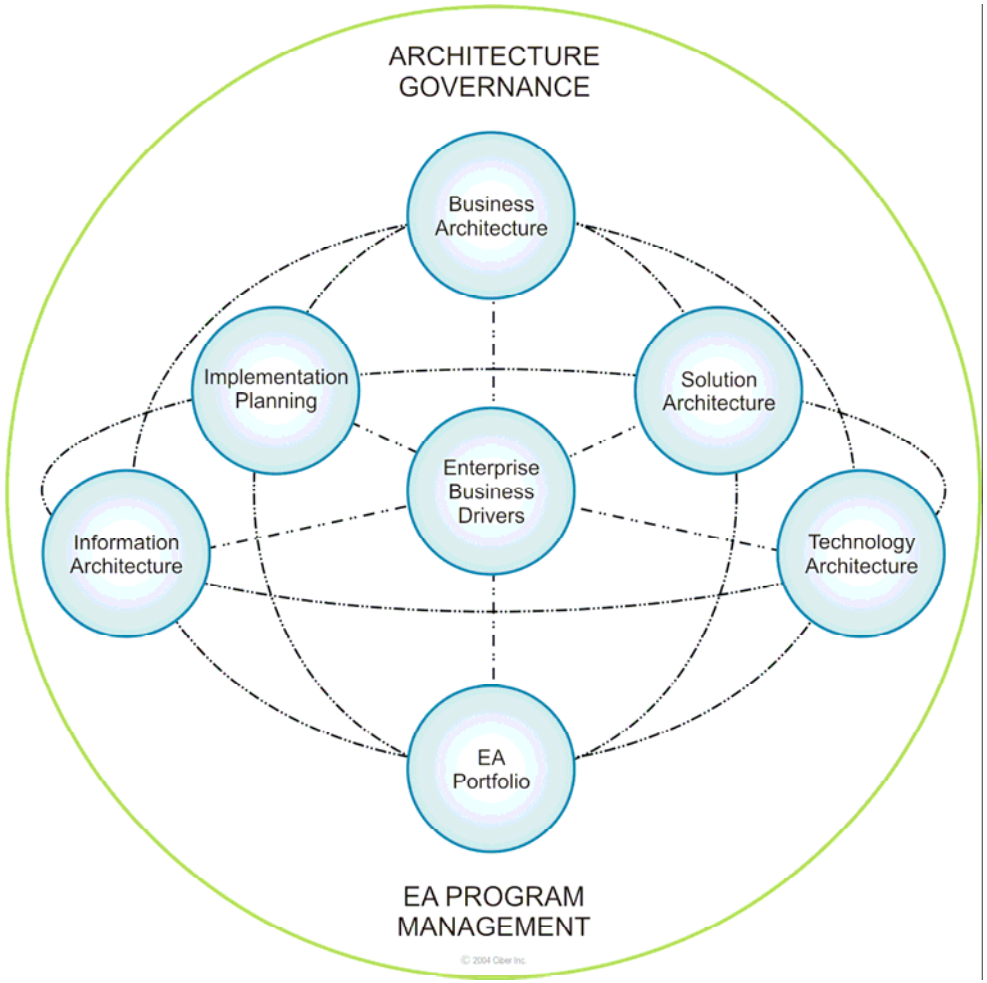
Federal EA Framework

- **Federal EA Framework is comprised of 8 elements**
  - Architecture Drivers
  - Strategic Direction
  - Current Architecture
  - Target Architecture
  - Transitional Processes
  - Architectural Segments
  - Architectural Models
  - Standards



NASCIO EA Framework

- **The NASCIO EA Framework is comprised of 9 elements**
  - Architecture Governance
  - EA Program Management
  - Enterprise Business Drivers
  - Business Architecture
  - Information Architecture
  - Technology Architecture
  - Solution Architecture
  - Implementation Planning
  - EA Portfolio

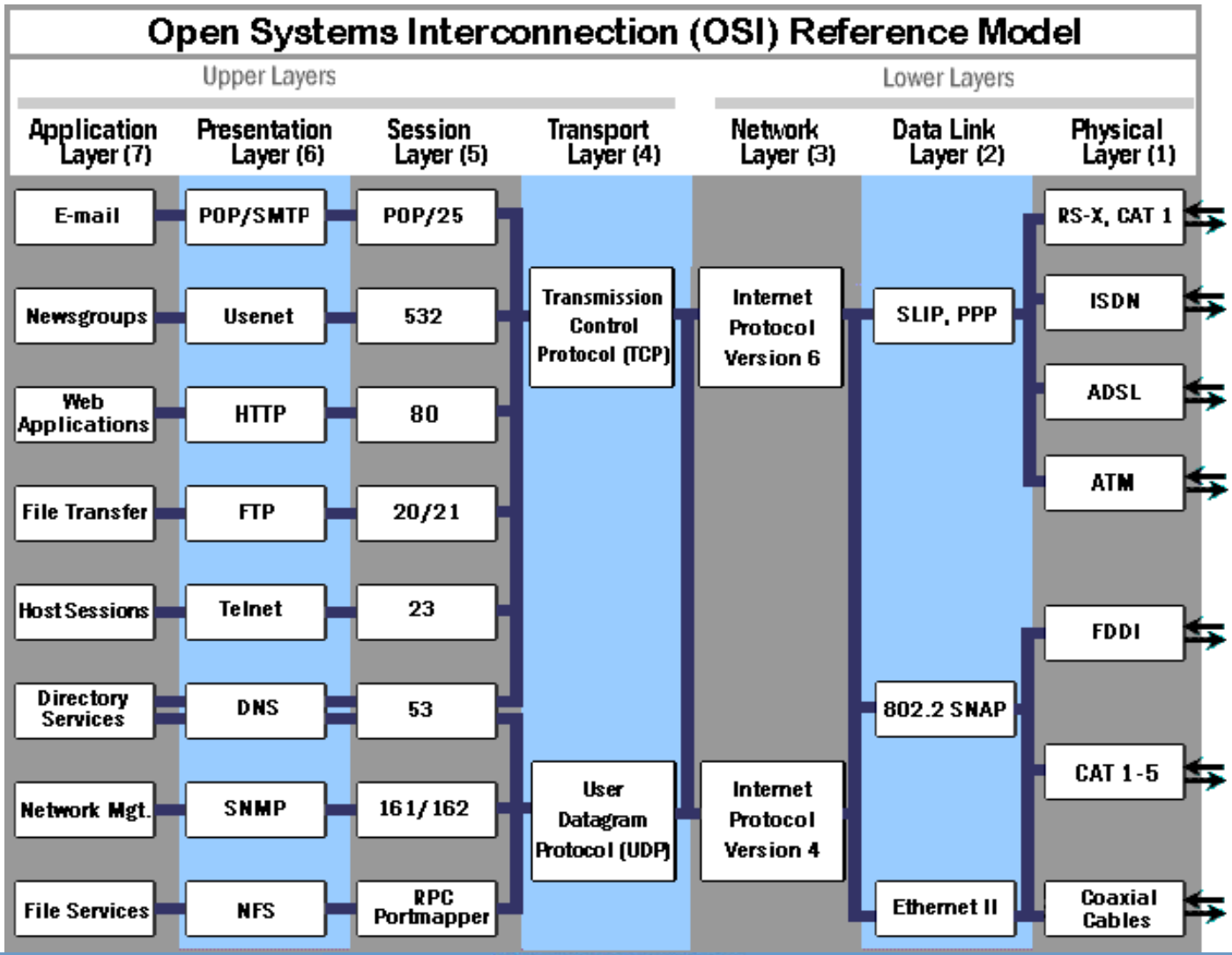


Technical Architecture Framework

Understanding Architectures vs. Frameworks

- Frameworks differ from Architectures
  - A Framework is a 'structured schema' to help address a problem. It is descriptive
  - An Architecture 'solves business and/or technological problems'. It is prescriptive
  - An Architecture then is the real-time *application & organization* of the various selected components that exist within the Framework towards a business/technological problem

Understanding Architectures vs. Frameworks *(cont'd)*



Technology Architecture

- A Technology Architecture may be based on one or more specific Technical Frameworks
  - A Technical Framework is a conceptual model used to structure information
  - A Technical Framework serves as a 'completeness check' to help practitioners understand what components may be required and how the components fit together

Zachman Architecture Framework

- The Zachman Framework is another example of a framework

Organized by *rows* & *columns*, the **technical** aspects are addressed in the Systems + Technology Rows

System Row

Technology Row

ENTERPRISE ARCHITECTURE - A FRAMEWORK ™

	DATA *What*	FUNCTION *How*	NETWORK *Where*	PEOPLE *Who*	TIME *When*	MOTIVATION *Why*	
SCOPE (CONTEXTUAL) *Planner*	List of Things Important to the Business ENTITY = Class of Business Thing	List of Processes the Business Performs Function = Class of Business Process	List of Locations in which the Business Operates Node = Major Business Location	List of Organizations Important to the Business People = Major Organizations	List of Events Significant to the Business Time = Major Business Event	List of Business Goals/Strat End/Means=Major Bus. Goal/ Critical Success Factor	SCOPE (CONTEXTUAL) *Planner*
ENTERPRISE MODEL (CONCEPTUAL) *Owner*	e.g. Semantic Model Ent = Business Entity Reln = Business Relationship	e.g. Business Process Model Proc. = Business Process I/O = Business Resources	e.g. Logistics Network Node = Business Location Link = Business Linkage	e.g. Work Flow Model People = Organization Unit Work = Work Product	e.g. Master Schedule Time = Business Event Cycle = Business Cycle	e.g. Business Plan End = Business Objective Means = Business Strategy	ENTERPRISE MODEL (CONCEPTUAL) *Owner*
SYSTEM MODEL (LOGICAL) *Designer*	e.g. Logical Data Model Ent = Data Entity Reln = Data Relationship	e.g. "Application Architecture" Proc. = Application Function I/O = User Views	e.g. "Distributed System Architecture" Node = I/S Function (Processor, Storage, etc) Link = Line Characteristics	e.g. Human Interface Architecture People = Role Work = Deliverable	e.g. Processing Structure Time = System Event Cycle = Processing Cycle	e.g., Business Rule Model End = Structural Assertion Means = Action Assertion	SYSTEM MODEL (LOGICAL) *Designer*
TECHNOLOGY MODEL (PHYSICAL) *Builder*	e.g. Physical Data Model Ent = Segment/Table/etc. Reln = Pointer/Key/etc.	e.g. "System Design" Proc = Computer Function I/O = Screen/Device Formats	e.g. "System Architecture" Node = Hardware/System Software Link = Line Specifications	e.g. Presentation Architecture People = User Work = Screen Format	e.g. Control Structure Time = Execute Cycle = Component Cycle	e.g. Rule Design End = Condition Means = Action	TECHNOLOGY CONSTRAINED MODEL (PHYSICAL) *Builder*
DETAILED REPRESENTATIONS (OUT-OF-CONTEXT) *Sub-Contractor*	e.g. Data Definition Ent = Field Reln = Address	e.g. "Program" Proc = Language Stmt I/O = Control Block	e.g. "Network Architecture" Node = Addresses Link = Protocols	e.g. Security Architecture People = Identity Work = Job	e.g. Timing Definition Time = Interrupt Cycle = Machine Cycle	e.g. Rule Specification End = Sub-condition Means = Step	DETAILED REPRESENTATIONS (OUT-OF-CONTEXT) *Sub-Contractor*
FUNCTIONING ENTERPRISE	e.g. DATA	e.g. FUNCTION	e.g. NETWORK	e.g. ORGANIZATION	e.g. SCHEDULE	e.g. STRATEGY	FUNCTIONING ENTERPRISE

Zachman Institute for Framework Advancement - (810) 231-0531

Technology Architecture

- A Technology Architecture defines the components and services, and their interrelations, that enable the delivery of Information Services
  - A Technology Architecture focuses on the delivery and synergetic mastery of the components and/or services for a given technology solution
  - A Technology Architecture allows for an understanding of the components (technologies) that support the business capabilities of the organization
  - A Technology Architecture contains a 'road-map', or blue-print, for how technology will support the organization's mission

Technology Architecture Benefits

- A Technology Architecture provides numerous benefits
  - Provides a basic framework for major change initiatives
  - Divides and conquers technical and organizational complexities
  - Preservation of existing investments in applications and technology by isolating each from changes in the other
  - Leverages scarce technical skills
  - Enhancements in productivity, flexibility, & maintainability
  - Increases in the predictability of the architecture
  - Serves as a construction blue-print and ensures consistency across systems

Technology Architecture Benefits *(cont'd)*

- More specific benefits of technology architecture include
  - Simplified Application Development
  - Quality
  - Integration
  - Extensibility
  - Location Transparency
  - Horizontal Scaling
  - Isolation
  - Portability
  - Reuse

Characteristics of Technology Architecture

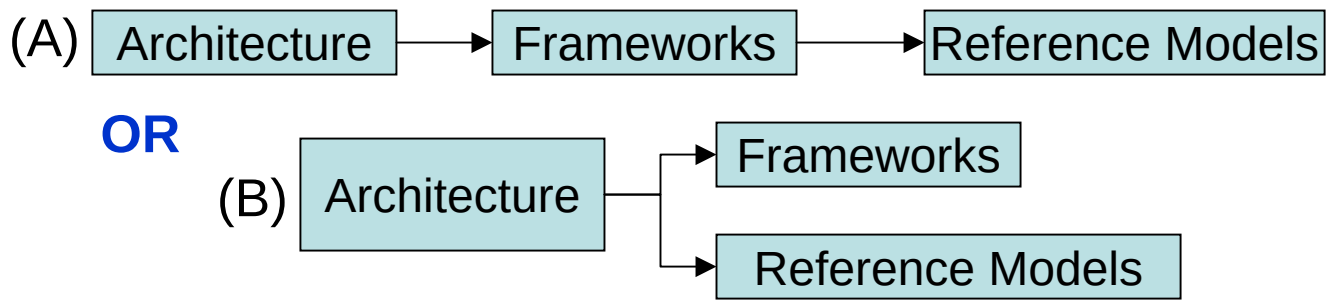
- There are *seven* general characteristics of a good architecture
  - Delimitation of the problem(s) to be addressed
  - Decomposition of the solution to components
  - Adequate documentation to permit vendor compliance
  - An auditing mechanism specified to each component and/or service
  - Definition of interfaces, formats, and protocols used between components
  - Policies, practices, and organizational structures that facilitate adoption of the architecture
  - Extendibility components to respond to Future Astounding Technologies

Technical Reference Model

Architecture Frameworks

(cont'd)

- Frameworks and Reference Models
  - The terms Framework & Reference Model are often used interchangeably
  - Some Architecture Frameworks are themselves a series of inter-related Reference Models (i.e. FEA and Model-Driven Architecture)



Technical Reference Model

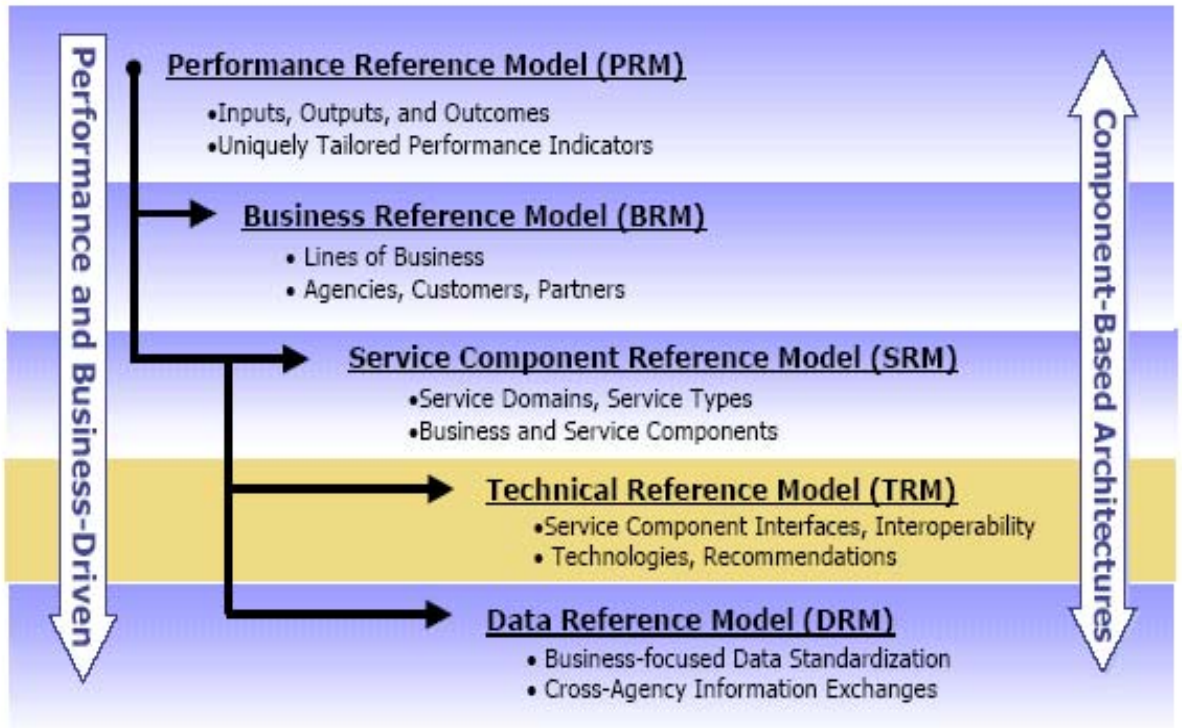
- A Technical Reference Model is used to identify the standards, specifications and technologies that support and enable the delivery of solutions and capabilities
- A Technical Reference Model identifies the core technologies that support an organizations information technology solutions
- A Technical Reference Model contains an inventory of current and future technology products and standards used across the organization

Technical Reference Model Benefits

- A Technical Reference Model provides numerous benefits
  - A Technical Reference Model provides the foundation to advance reuse
  - A Technical Reference Model leverages information about common technologies to allow collaboration
  - A Technical Reference Model allows economies of scale by identifying and reusing the best solutions and technologies

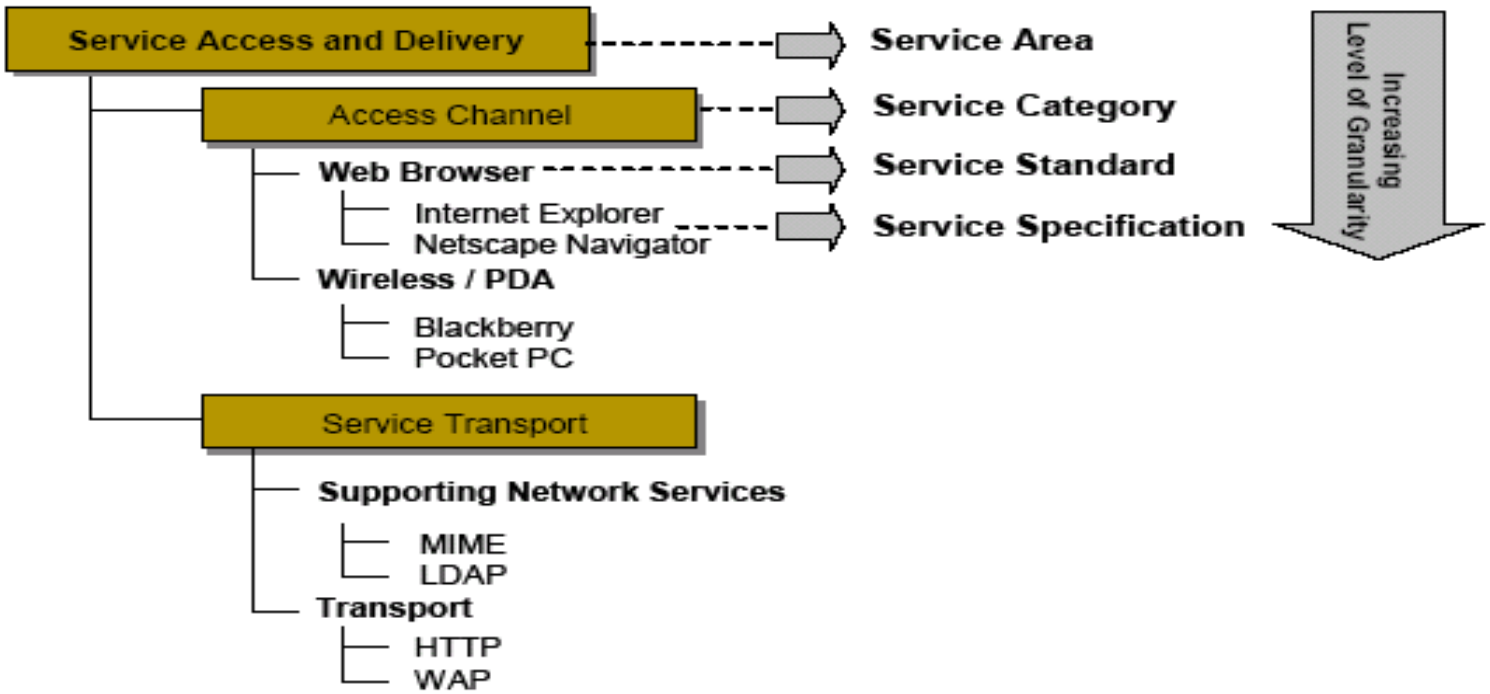
Federal EA Reference Models

- The Federal Enterprise Architecture (FEA) is defined as being comprised of a *series* of Reference Models



FEA TRM

- The FEA TRM can be decomposed into Service Areas, Service Categories, Service Standards, and Service Specifications



FEA TRM *(cont'd)*

Service Access and Delivery

Access Channels	Delivery Channels	Service Requirements	Service Transport
Web Browser	Internet, Intranet	Legislative / Compliance	Network Services
Wireless / PDA Device	Extranet	Authentication / Single Sign-On	Transport
Collaboration / Communication	Peer to Peer (P2P)	Hosting	
Other Electronic Channels	Virtual Private Network (VPN)		

Service Platform and Infrastructure

Support Platforms	Delivery Servers	Hardware / Infrastructure
Wireless / Mobile	Web, Media	Servers / Computers
Platform Independent (J2EE)	Application	Embedded Technology Devices
Platform Dependent (.NET)	Portal	Peripherals
		WAN, LAN
Database / Storage	Software Engineering	Network Devices / Standards
Database	Integrated Development Environment (IDE)	Video Conferencing
Storage Devices	Software Configuration Management (SCM)	
	Testing Management, Modeling	

Component Framework

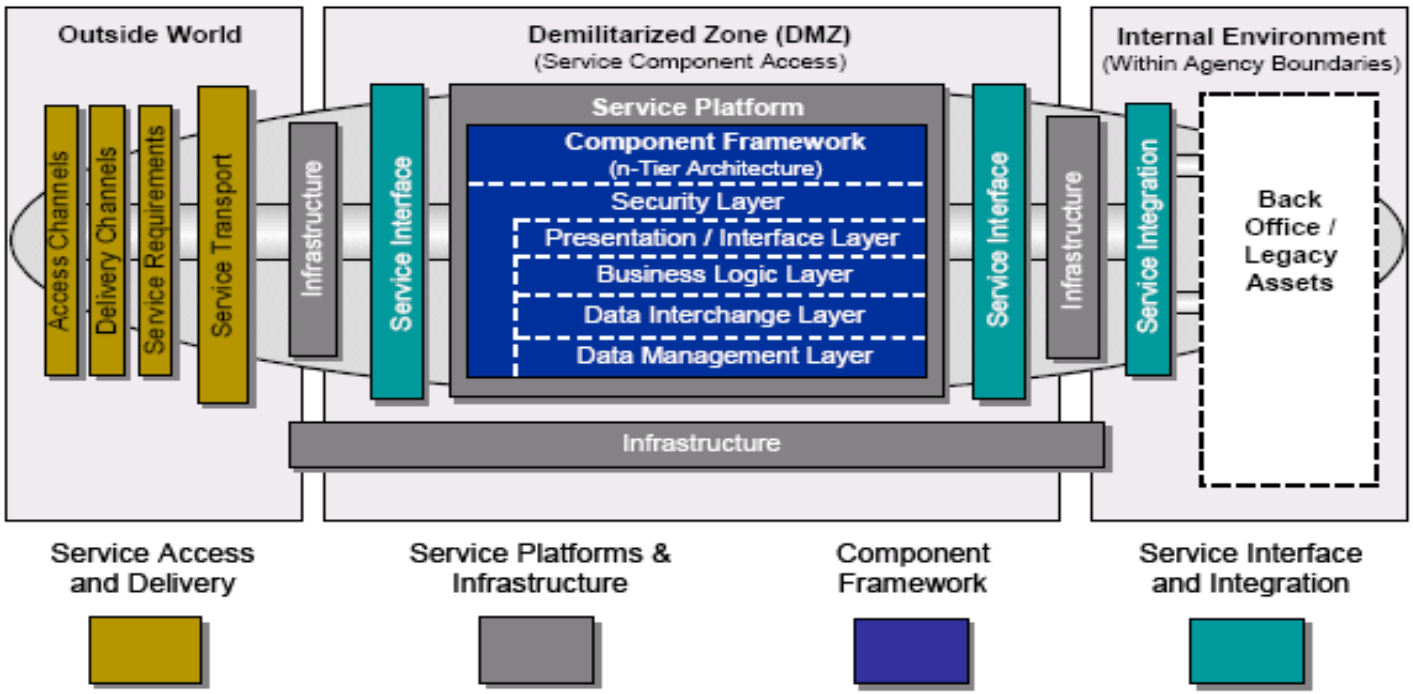
Security	Presentation / Interface	Business Logic	Data Management
Certificates / Digital Signature	Static Display	Platform Independent	Database Connectivity
Supporting Security Services	Dynamic Server-Side Display	Platform Dependent	Reporting and Analysis
	Content Rendering		
Data Interchange	Wireless / Mobile / Voice		
Data Exchange			

Service Interface and Integration

Integration	Interoperability	Interface
Middleware	Data Format / Classification	Service Discovery
Database Access	Data Types / Validation	Service Description / Interface
Transaction Processing	Data Transformation	
Object Request Broker		

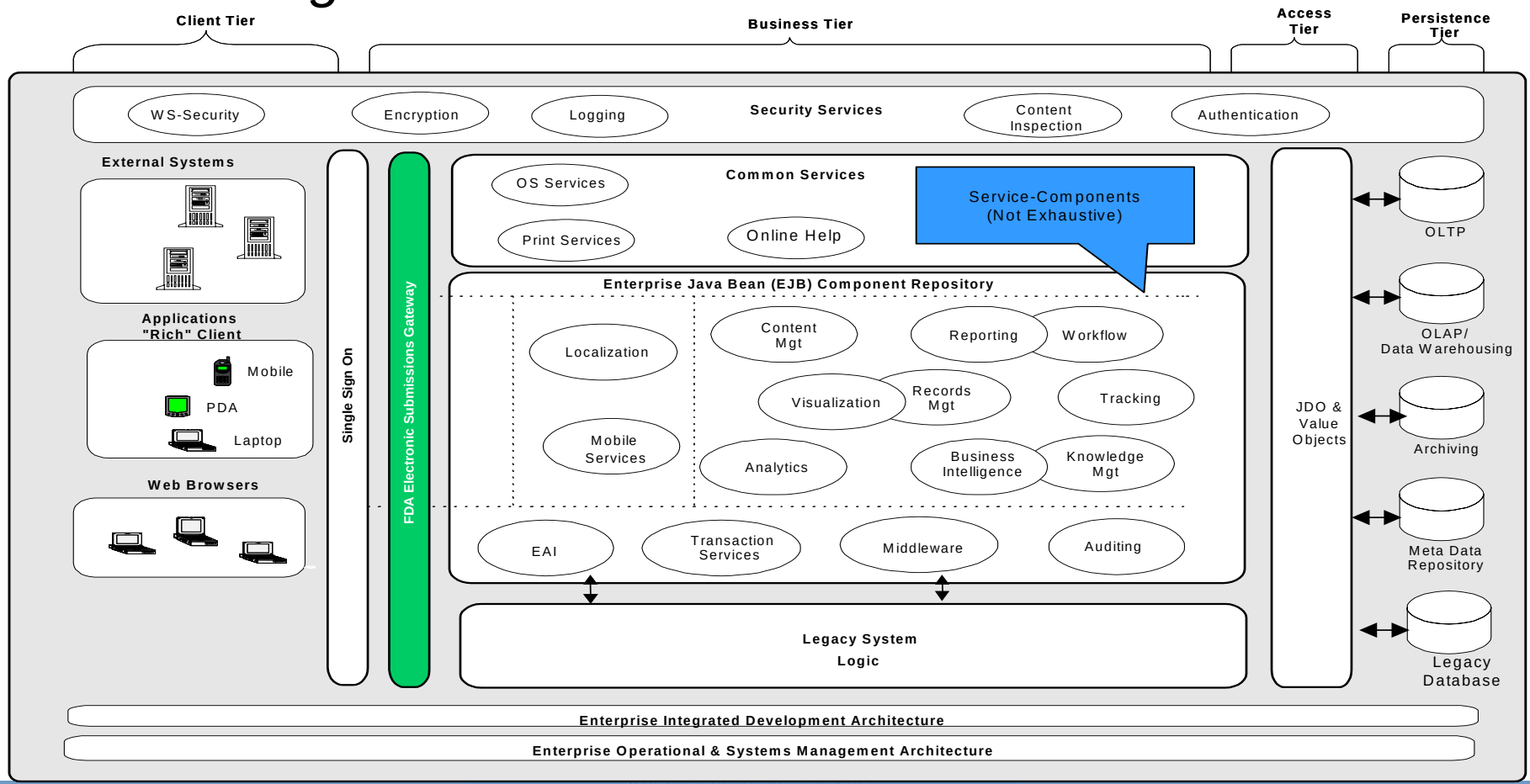
FEA TRM *(cont'd)*

- The FEA Technical Reference Model (TRM) describes the standards, specifications, and technologies the support the secure delivery of e-Gov solutions

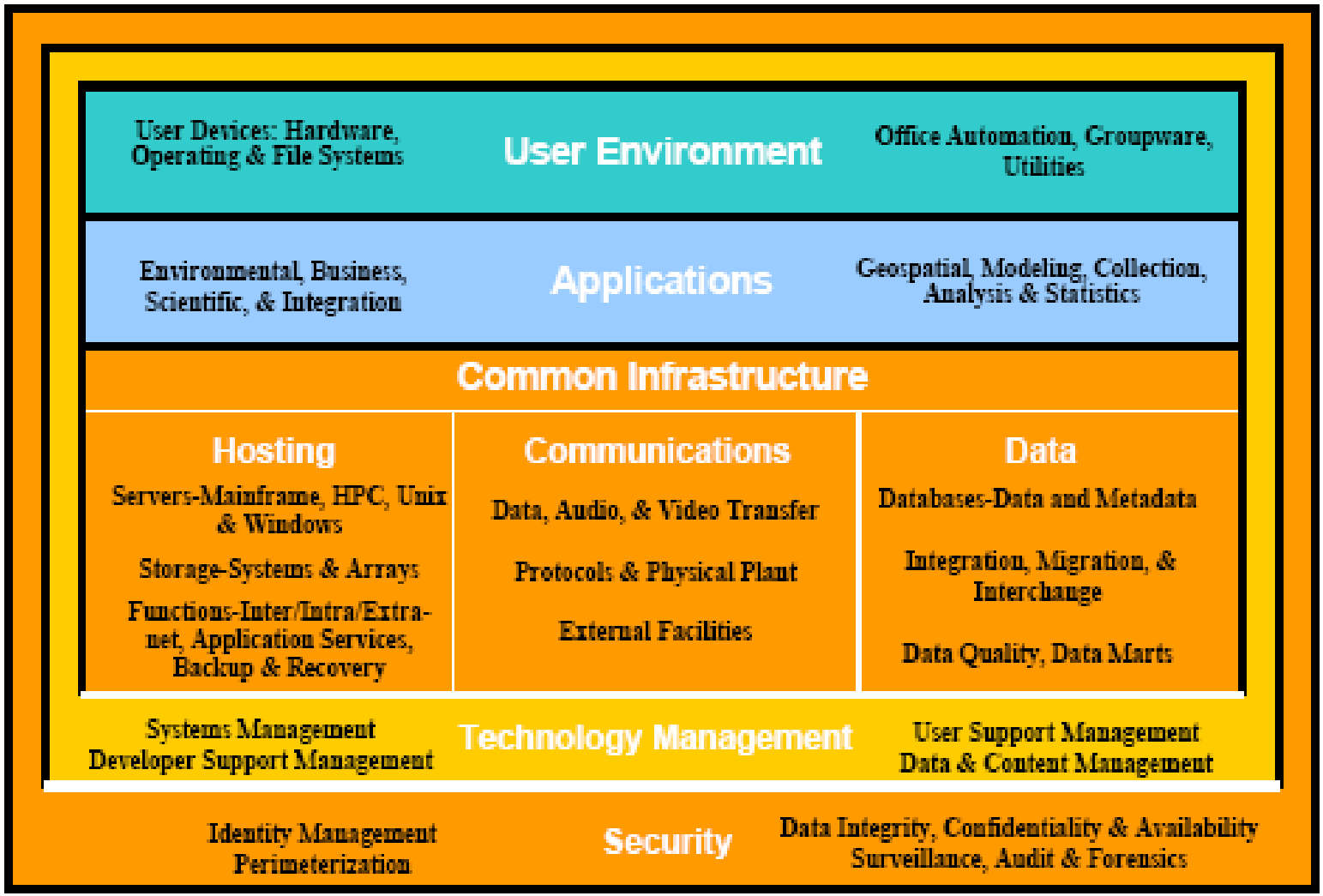


Case Study – US FDA Technology Architecture

- FDA Technology Architecture stresses *Integration Modeling*

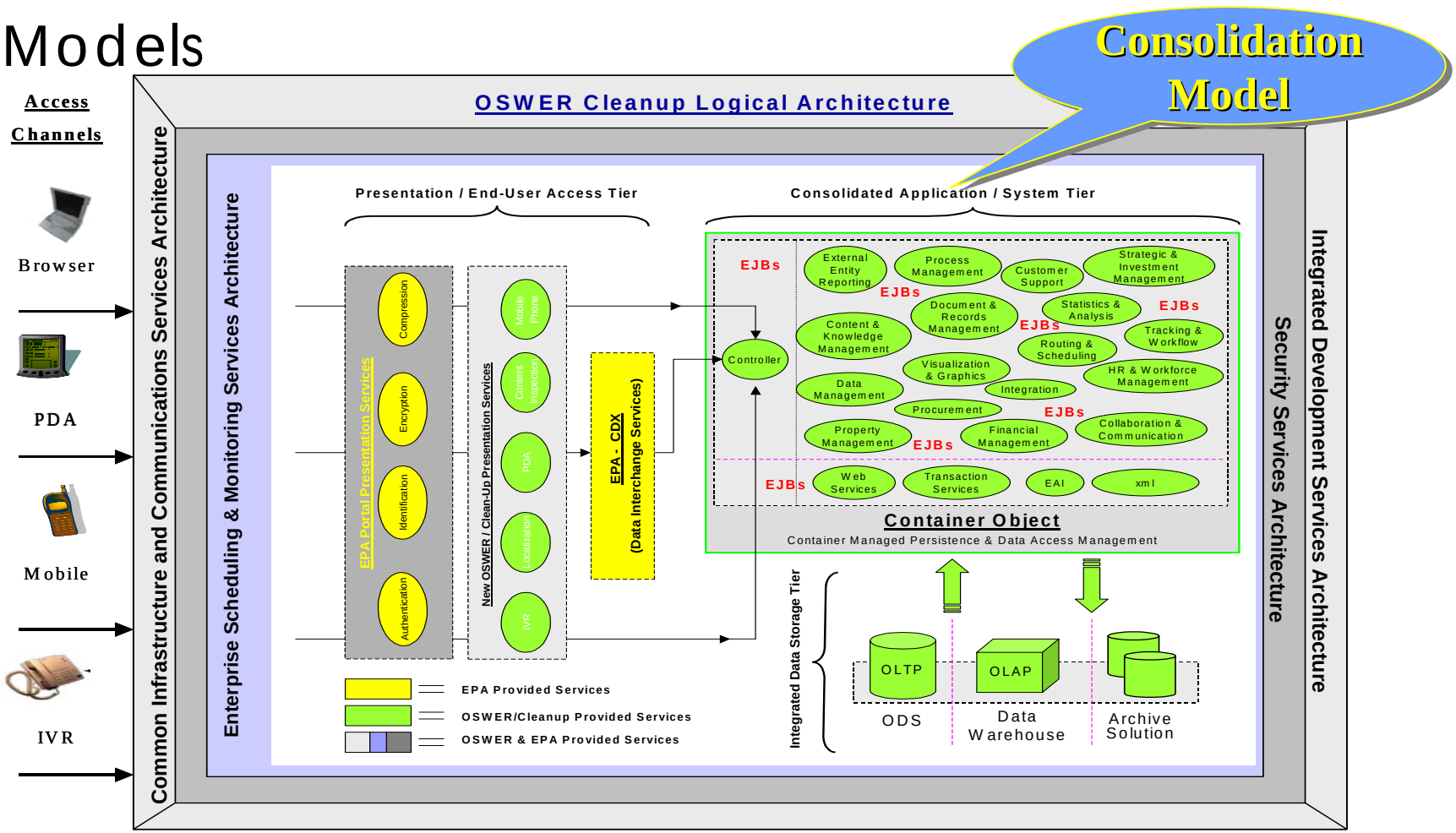


US EPA TRM


User Devices: Hardware, Operating & File Systems
User Environment
Office Automation, Groupware, Utilities
Environmental, Business, Scientific, & Integration
Applications
Geospatial, Modeling, Collection, Analysis & Statistics
Common Infrastructure
Hosting
Servers-Mainframe, HPC, Unix & Windows
Storage-Systems & Arrays
Functions-Inter/Intra/Extra-net, Application Services, Backup & Recovery
Communications
Data, Audio, & Video Transfer
Protocols & Physical Plant
External Facilities
Data
Databases-Data and Metadata
Integration, Migration, & Interchange
Data Quality, Data Marts
Systems Management
Developer Support Management
Technology Management
User Support Management
Data & Content Management
Identity Management
Perimeterization
Security
Data Integrity, Confidentiality & Availability
Surveillance, Audit & Forensics
USEPA - ©2002

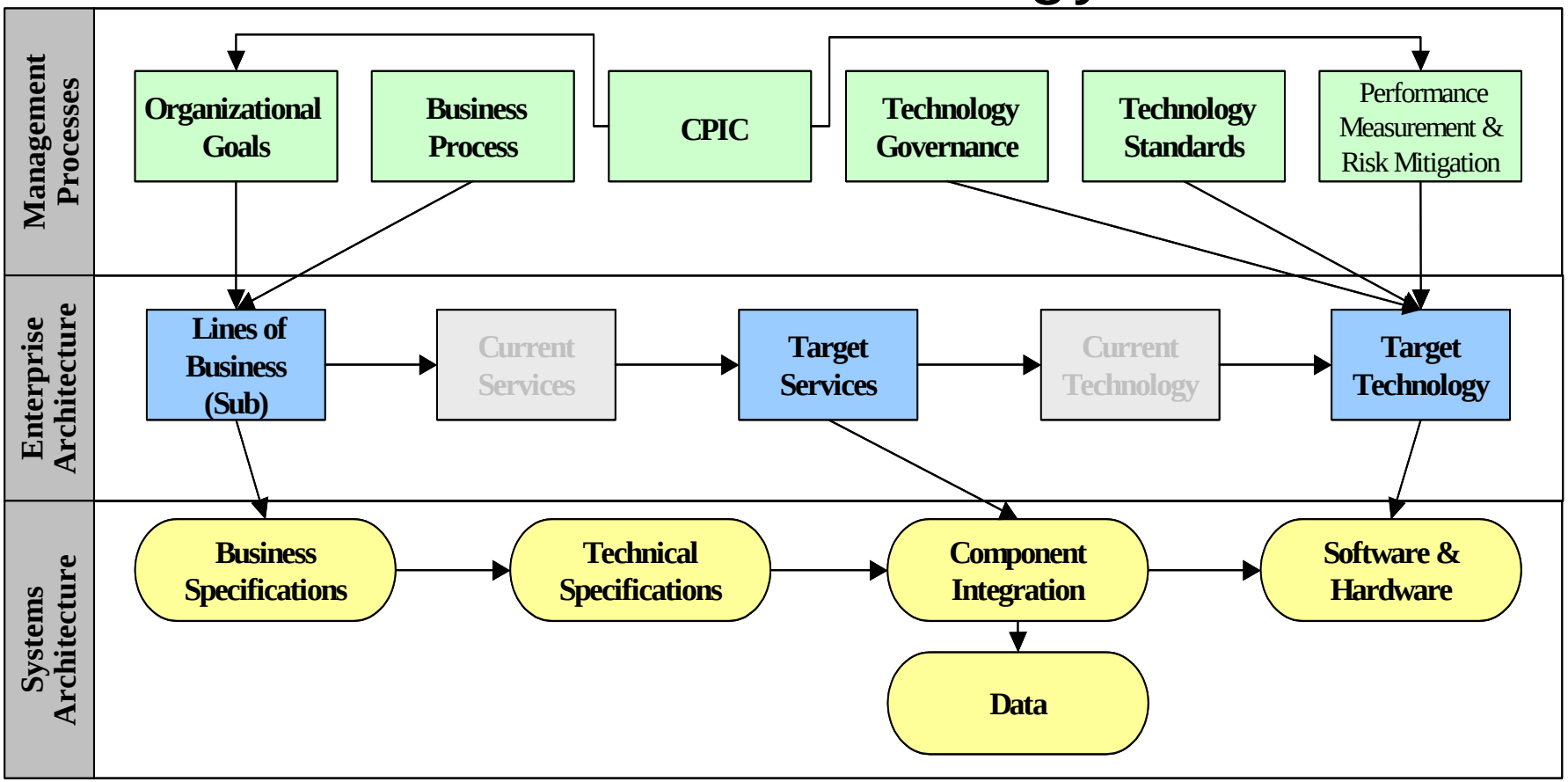
Case Study – US EPA/OSWER Technology Architecture

- Based on FEA Service & Technical Reference Models



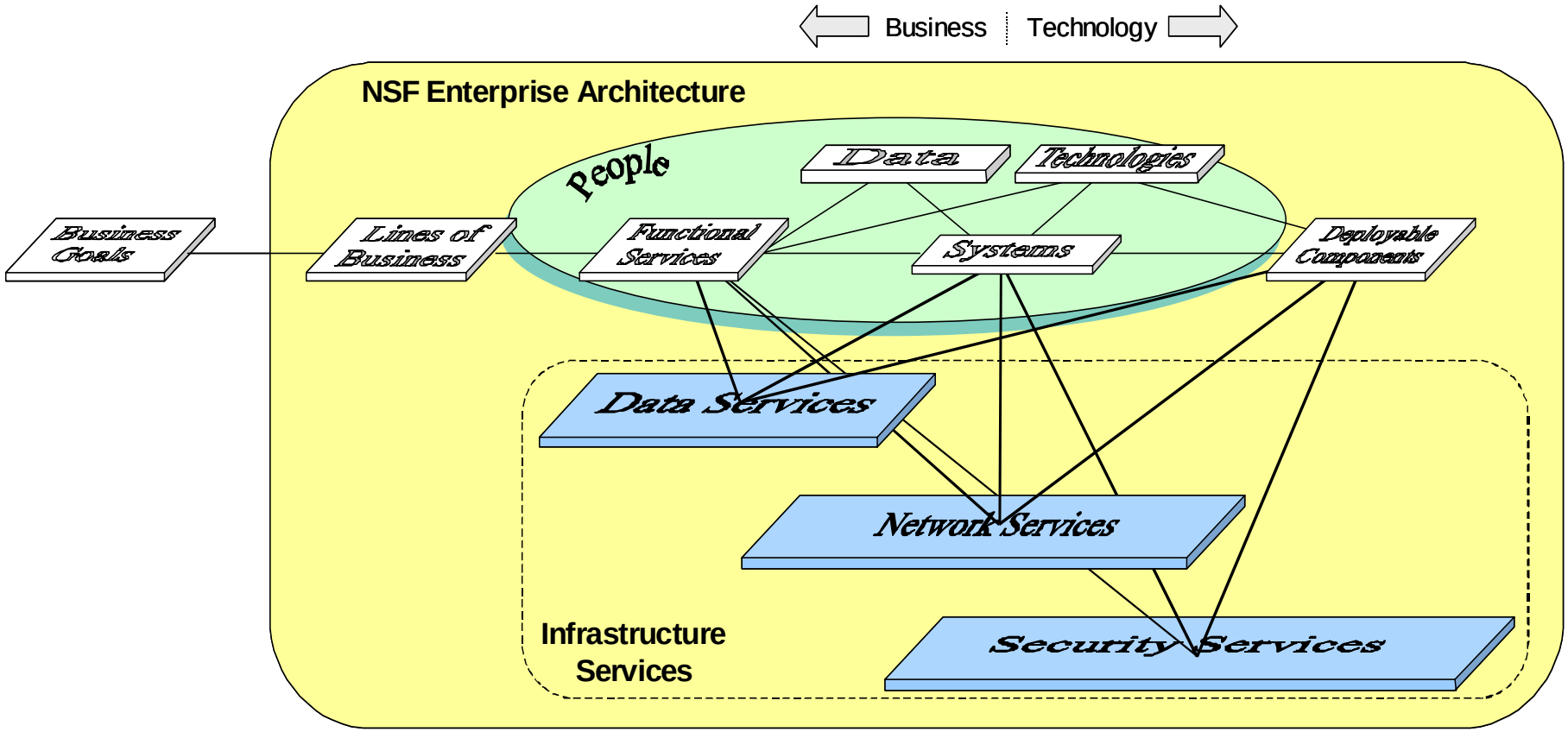
Case Study – NSF Technology Architecture

- NSF Technology Architecture stresses linkages between business & technology



Case Study – NSF Technology Architecture

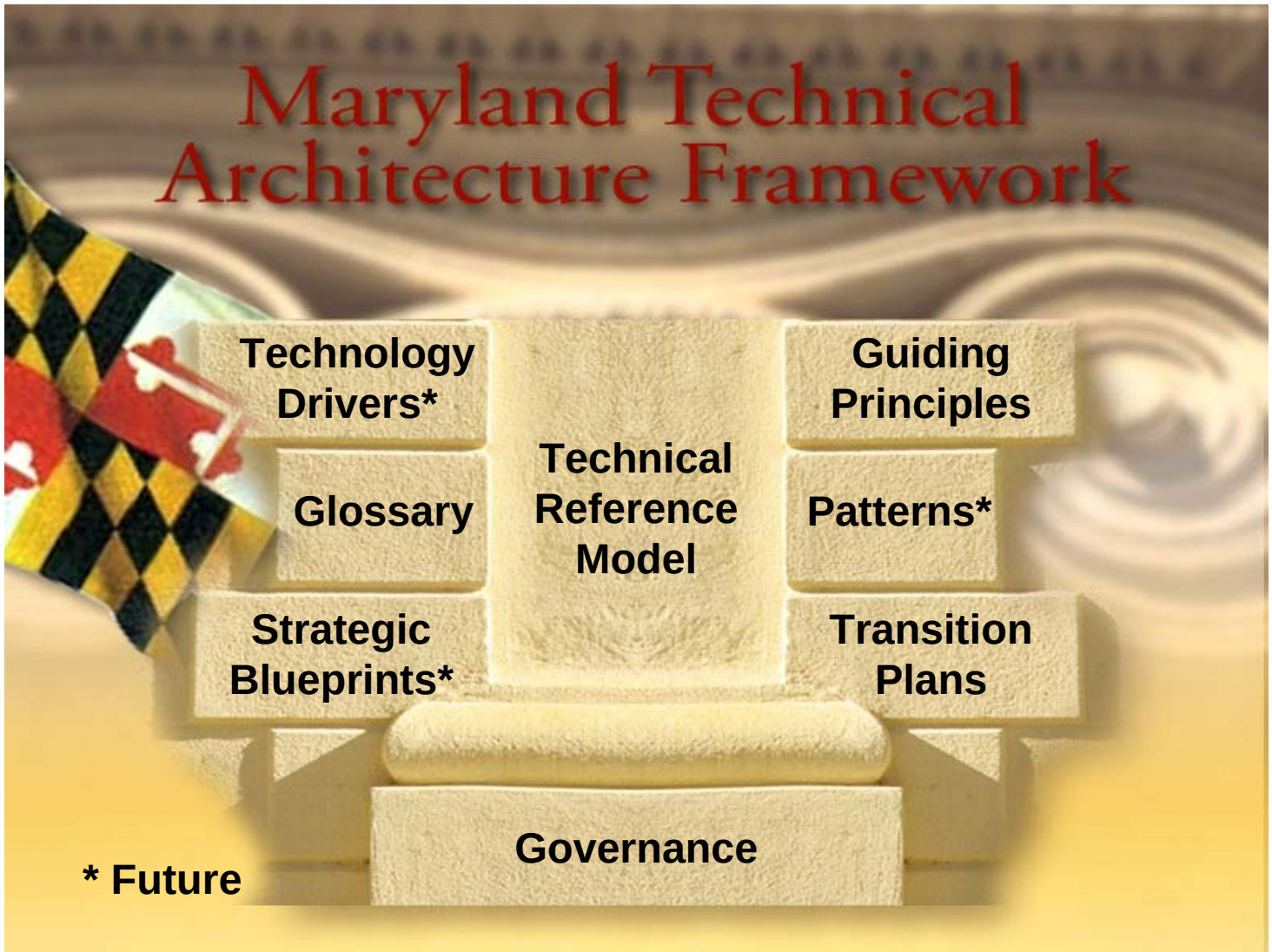
- NSF Technology Architecture is a *Service-Oriented Architecture*



State of Maryland

Maryland EA Framework

Maryland Technical Architecture Framework



Maryland Technical Reference Model

User Access

Access Devices | Access Control Devices | I/O Peripherals | Business Support Software

Software Development

Programming Languages | Software Configuration Management | Software Engineering

Integration

Middleware | Interoperability | Interface | Data Interchange

Infrastructure

Test Management | System Management | Security Management | Database/Storage

Platforms | Operating Systems | Delivery Servers | Security Services

Network

Transport | Network Infrastructure | Network Devices | Network Services

Maryland TRM

User Access

Access Devices
- Handheld Device
- Dumb Terminal
- Kiosk
- Satelite Device
- Touch Screen
- Wireless Handheld Device

Access Control Devices
- Smart Card
- Fingerprint Scanner
- Retina Scanner
- Random Passcode Generators

I/O Peripherals
- Modem
- Microphone
- Printer
- FAX Machine
- TTY
- ZIP Drive
- Floppy Drive
- Removable Storage
- 2-way Radio
- Bar Code Scanner
- Image Scanner
- Projector
- Video Camera

Business Support Software
- Browser
- Emulator
- Operating Systems
- Voice Recognition
- Productivity Tools

Software Development

Programming Languages
- Markup Languages
- Business Logic
- Database Languages
- Multipurpose Languages
- Analysis Languages

Software Configuration Management
- Version Management
- Defect Tracking
- Issue Management
- Task Management
- Change Management
- Deployment Management
- Requirements Management
- Project Management

Software Engineering
- Modeling
- Design
- Integrated Development Environment

Maryland TRM *(cont'd)*

Integration

Middleware
- Message Oriented
- Remote Procedure Calls
- Transaction Processing
- Object Request Broker

Interoperability
- Data Format /Classification
- Data Types/ Validation
- Data Transformation

Interface
- Service Discovery
- Service Description /Interface

Data Interchange
- Data Exchange
- Database Connectivity

Network

Transport
- Web Transport
- Mobile Transport
- Wireless LAN
- Service Transport
- Video\Voice Transport
- Encryption

Network Infrastructure
- Frame Relay
- Asynchronous Transfer Mode (ATM)
- Ethernet
- Token Ring
- Virtual LAN (VLAN)

Network Devices
- Hub
- Switch
- Router
- NIC
- Transceivers
- Gateway
- ISDN
- T1/T3
- Digital Subscriber Line (DSL)
- Firewall
- VPN

Network Services
- Network Support
- Directory Services
- Messaging
- Voice
- Management
- Border Gateway Protocol
- Application Gateway
- Network Address Management
- Naming Services
- Remote Access
- VPN

Maryland TRM *(cont'd)*

Infrastructure

Test Management
- Functional Testing
- Usability Testing
- Performance Testing
- Load/Stress/Volume Testing

System Management
- System Monitoring
- Desktop Management
- Network Monitoring
- Fail Over
- Server Management
- Web Server Management
- Inventory Management
- Load Balancing
- Network Inventory & Distribution
- Asset Management
- Operations Management
- Configuraiton Management
- Enterprise Architecture Management

Security Management
- Security and Access Control Testing
- Virus Management

Database/Storage
- Database (RDBMS)
- Storage
- Backup & Recovery
- Modeling
- Metadata Management

Platforms
- Partitioning
- Peripherals
- Video conferencing
- Mainframe
- Server
- Peripherals
- Graphics
- SAN
- NAS
- Cables
- CD-Rom Drives
- Data Storage
- Desktops

Operating Systems
- Mainframe
- Middle Tier
- Personal Computers
- File and Printers
- Mobile Devices

Delivery Servers
- Application Servers
- Web Servers
- Knowledge Management
- Business Process Management
- Content Management
- Search Engine
- Business Services
- Mail Servers
- Collaboration Servers
- Media Servers
- Portal Servers
- Application Servers

Security Services
- Digital Cerificate
- Firewall Services
- Access Control
- Directory Access
- Audit Trail Creation
- Authentication
- Database Security Services
- Electronic Signatures
- Host Intrusion Detection
- Network Instrusion Detection
- Encryption
- Virus Protection

E-mail View

User Access

Access Devices | Access Control Devices | I/O Peripherals | Business Support Software

Software Development

Programming Languages | Software Configuration Management | Software Engineering

Integration

Middleware | Interoperability | Interface | Data Interchange

Infrastructure

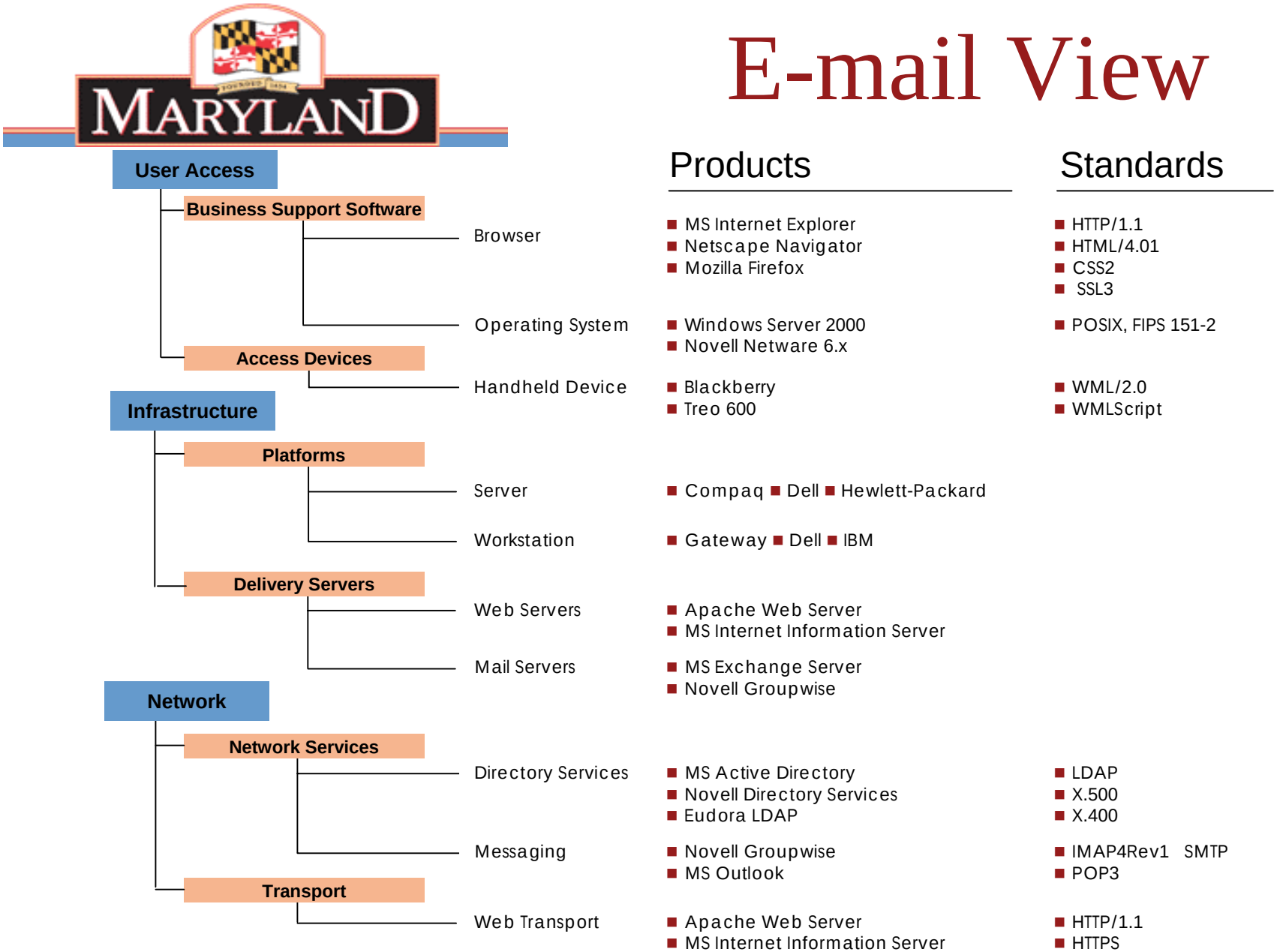
Test Management | System Management | Security Management | Database/Storage

Platforms | Operating Systems | Delivery Servers | Security Services

Network

Transport | Network Infrastructure | Network Devices | Network Services

E-mail View


User Access
Business Support Software
Browser
Operating System
Access Devices
Handheld Device
Infrastructure
Platforms
Server
Workstation
Delivery Servers
Web Servers
Mail Servers
Network
Network Services
Directory Services
Messaging
Transport
Web Transport
Products
MS Internet Explorer
Netscape Navigator
Mozilla Firefox
Windows Server 2000
Novell Netware 6.x
Blackberry
Treo 600
Compaq Dell Hewlett-Packard
Gateway Dell IBM
Apache Web Server
MS Internet Information Server
MS Exchange Server
Novell Groupwise
MS Active Directory
Novell Directory Services
Eudora LDAP
Novell Groupwise
MS Outlook
Apache Web Server
MS Internet Information Server
Standards
HTTP/1.1
HTML/4.01
CSS2
SSL3
POSIX, FIPS 151-2
WML/2.0
WMLScript
LDAP
X.500
X.400
IMAP4Rev1 SMTP
POP3
HTTP/1.1
HTTPS

Upcoming Events

The schedule for upcoming MTAF EA Awareness Seminar is as follows:

- Tuesday, January 25th, 2005
- Thursday, February 24th, 2005
- Monday, April 25th, 2005

Contact Us

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Paula Ebnet 410-260-7197

Thank You